Applied Physics & OSA

Optics Seminar

Terahertz detection of many-body signatures in semiconductor heterostructures

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Abstract:

The collective response of many-body systems in semiconductor heterostructures is studied by means of THz time-domain spectroscopy. This makes it possible to unambiguously identify correlated states in semiconductors such as plasmons or excitons. We present investigations of a two dimensional electron gas in a high electron-mobility transistor-like structure. While it is commonly accepted that the plasma frequency in two dimensions vanishes with vanishing momentum, we measure a plasmon pole in the transmission spectra of our system. Furthermore, the observed density dependence is similar to the 3D system. Also, experimental evidence of different excitonic behavior in GaAs/AlGaAs and (GaIn)As/GaAs quantum wells is presented. The dynamics of the induced absorption of the 1s-2p transition is monitored after optical excitation at the 1s resonance. A microscopic many-body analysis is used to explain the measured results.

Brief Biography:

Dr. Chatterjee received his diploma at the University of Karlsruhe, Germany in Prof. M. Wegener's group for investigations on "Signature of Electron-Plasmon Quantum Kinetics in GaAs". During his graduate studies at the Optical Sciences Center at The University of Arizona in Prof. Hyatt Gibbs' group he investigated exciton formation dynamics in (GaIn)As/GaAs quantum wells and was involved in the realization of semiconductor nanocavities for cavity-QED experiments. After joining the Philipps-Universität Marburg, his research interests include gain spectroscopy of various standard and novel materials, including dilute nitrides and direct III-V-semiconductors on GaP or Si, spectroscopy of manybody-excitations in semiconductor heterostructures, especially exciton dynamics and semiconductor disk lasers.

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4:00pm-5:00pm.

Watson 104

Refreshments will be available in the Watson Lobby at 3:45pm